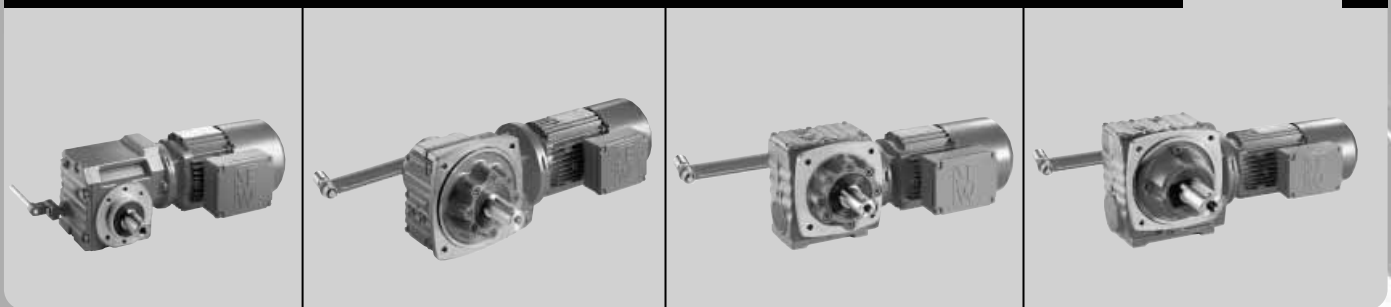
SEW EURODRIVE

# Geared Motors HW30, HS40, HS41, HK40, HS50, HS60 for Trolley Drive Systems

Edition

*07/2000*



## Operating Instructions

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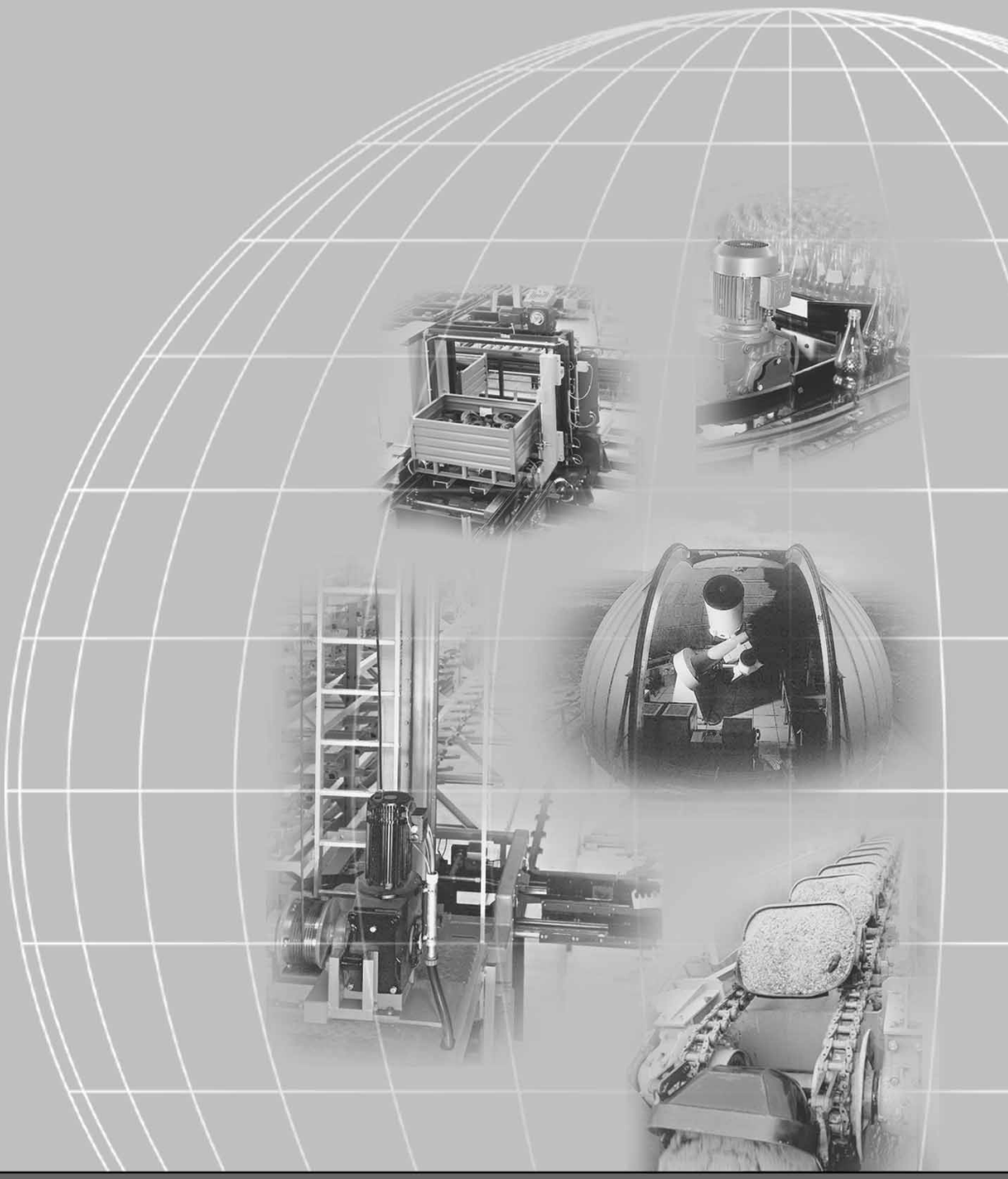


## SEW-EURODRIVE

**1 Important Notes ..... 4**

**2 Safety Instructions ..... 5**

**3 Installation ..... 6**
3.1 Before you begin ..... 6
3.2 Preliminary work ..... 6
3.3 Installing the gear unit ..... 6

**4 Assembly / Disassembly ..... 8**
4.1 Required tools ..... 8
4.2 Installing the drive rod ..... 8
4.3 Gear units with solid shafts ..... 8

**5 Commissioning ..... 10**
5.1 Commissioning of gear units HW30 and helical-worm gear units HS ..... 10

**6 Inspection / Maintenance ..... 11**
6.1 Inspection and maintenance intervals ..... 11
6.2 Lubricant change intervals ..... 11
6.3 Inspection and maintenance ..... 12

**7 Operation and Service ..... 13**
7.1 Gear unit malfunction ..... 13

**8 Mounting Positions ..... 14**
8.1 General information on mounting positions ..... 14
8.2 HW30 D.. ..... 15
8.3 HS40 D.., HS41 D.. ..... 16
8.4 HK40D... ..... 17
8.5 HS50 D.., HS60 D.. ..... 18

**9 Technical Data ..... 19**
9.1 Lubricant filling quantities ..... 19
9.2 Recommended lubricants for SEW drives ..... 20

# 1 Important Notes

***Warning and Safety Instructions***

**Always follow the warnings and safety instructions in this publication!**

**Electrical hazard**
Possible effects: Serious or fatal injury.

**Immediate danger**
Possible effects: Serious or fatal injury.

**Dangerous situation**
Possible effects: Minor injury.

**Harmful situation**
Possible effects: Damage to equipment or surroundings.

Application hints and useful information.

Following these instructions is required for fault-free operation and fulfillment of any warranty claims. Read these instructions carefully before you start working with the unit!

These operating instructions contain vital servicing information and should be kept in the vicinity of the unit.

***Disposal***

**(please observe all applicable regulations):**

- Housing components, gears, shafts and rolling bearings of gear units should be disposed of as steel scrap. The same applies to components made of cast iron if no separate collection is available.
- Helical-worm wheels consist partially of non-ferrous metal and should be disposed of accordingly.
- Collect used oil and dispose of it according to applicable regulations.

- **In case of design changes, adjust the lubricant filling amounts accordingly.**
- **Please observe the information in Section 3.3!**

# 2 Safety Instructions

***Preliminary remarks***

The following safety instructions refer primarily to the operation of gear units.

When operating **geared motors**, please also observe safety instructions for motors in the corresponding operating instructions.

**Please refer to the additional safety instructions in the individual sections of these operating instructions.**

***General***

During and after operation, geared motors and gear units contain live and moving components and possibly hot surfaces.

**All tasks related to transport, storage, installation/assembly, connection, startup, service and maintenance may only be performed by qualified technical personnel while strictly adhering to**

- the pertinent detailed operating instruction(s) and circuit diagrams
- warning and safety labels on the gear unit/geared motor
- system-specific regulations and requirements
- national/regional regulations concerning safety and accident prevention

**Serious personal injuries and material damage may occur through**

- incorrect use
- wrong installation or operation
- inadmissible removal of required protective covers or of the housing

***Intended usage***

These geared motors/gear units are intended for industrial systems. They comply with existing standards and regulations. The technical data and information on approved conditions can be found on the nameplate and in the documentation.

All these details must be observed!

***Transport / Storage***

**Inspect shipment for possible transport damages upon receipt. Immediately inform the shipping company of any damages. Startup may have to be cancelled.**

Fasten installed lifting eyebolts. They were designed for the weight of the geared motor/ gear unit; no additional loads may be applied.

If necessary, use appropriate and sufficiently dimensioned means of transport. Remove existing shipping braces prior to startup.

***Installation / Assembly***

Observe information in sections 3 and 4!

***Commissioning / Operation***

Check the correct direction of rotation of the gear unit in its **disengaged** state (without built-on geared motor). Pay special attention to unusual sliding noises during barring. Secure the key for the trial run without output components. Do not deactivate monitoring and protection devices – not even for the trial run.

If in doubt, modifications to normal operation (e.g. increased temperature, noises, vibrations) may require that the geared motor be switched off. Determine the cause and confer with SEW, if necessary.

***Inspection / Maintenance***

Observe information in section 6!

# 3 Installation

## 3.1 Before you begin

***The drive may only be installed if***

- the entries on the nameplate of the geared motor match the supply voltage
- the drive is not damaged (no damage resulting from transport or storage)
- it is certain that the following requirements have been fulfilled:
  - with all gear units: ambient temperature between 0 °C and +40 °C, no oils, acids, gases, vapors, radiation, etc.
  - with special versions: drive configured according to ambient conditions
  - with Spiroplan® gear unit HW30 and helical-worm gear HS..:
    no large external mass moments of inertia are present that could exert a restoring load on the gear unit (with η' (restoring) = 2 – 1/η < 0.5 self-locking)

## 3.2 Preliminary work

Output shafts and flange surfaces must be thoroughly cleaned of anti-corrosion agents, contamination or similar impurities (use a commercially available solvent). Do not let the solvent get in contact with the sealing lips of the oil seals – danger of damage to the material!

**Please note:** The service life of the lubricant in the bearings is reduced if the unit is stored ≥ 1 year.

**Gear unit designs of the "extended storage" type have**

- an oil fill suitable for the mounting position so the unit is ready to run (mineral oil). Nevertheless, check the oil level prior to startup (see “Lubricant filling quantities" on page 19).
- a partially higher oil level if synthetic oil is used. Correct the oil level prior to startup (see “Lubricant filling quantities" on page 19).

## 3.3 Installing the gear unit

The gear unit or geared motor must be mounted/installed in the specified mounting position (Spiroplan® gear units are not dependent upon mounting position) on a level[1)], vibration-absorbing and torsionally rigid support structure. Do not tighten housing legs and mounting flanges against each other.

**The oil check and drain screws and the breather valves must be freely accessible!**

At this point of assembly, please check that the oil filling is as specified for the mounting position.

**In case of design changes, adjust the lubricant filling amounts accordingly**.

Where the mounting position of HS gear units is to be changed to mounting position M2, please consult the SEW service department.

1) Maximum permitted flatness error for flange mounting (approximate value with reference to DIN ISO 1101): with → flange 120 – 600 mm max. error 0.2 – 0.5 mm

Use plastic inserts (2–3 mm thick) if there is a risk of electrochemical corrosion between the gear unit and the driven machine (connection between different metals such as cast iron and high-grade steel)! Also fit the bolts with plastic washers! Ground the housing additionally – use the grounding bolts on the motor.

***Installation in damp areas or on the outside***

Gear units are supplied in corrosion-resistant versions for use in damp areas or in the open air. Any damage to the paintwork (e.g. on the breather valve) must be repaired.

***Gear unit venting***

All gear units are delivered by SEW ready for the mounting position with the breather valve and transport fixture fitted.

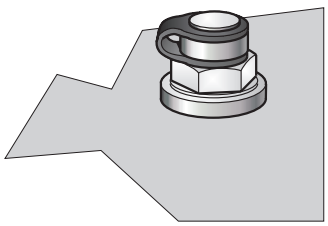
**Exception:**
Gear units for extended storage, pivoting and inclined mounting positions are delivered with a screw plug on the intended vent hole. Prior to startup, the customer must replace the highest screw plug by the supplied breather valve on each individual gear unit!

- **With geared motors** (for extended storage, pivoting or inclined mounting position), the supplied breather valve is located in the **terminal box on the motor**.
- **With mount-on units** that must breathe on the input side, a breather valve is supplied in a plastic bag.
- **With gear units in an enclosed design** no breather valve is supplied.

*Activating the breather valve*

Usually the breather valve is activated ex-works. **Should this not be the case, the transport fixture must be removed from the breather valve prior to the startup of the gear unit!**

**1.** Breather valve with transport fixture



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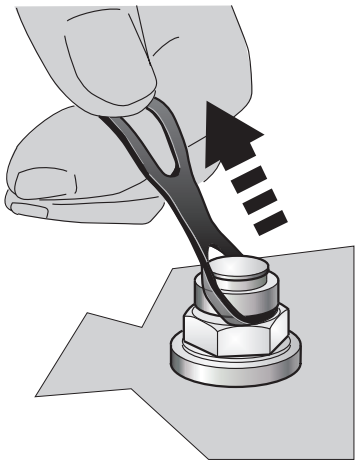
**2.** Remove the transport fixture



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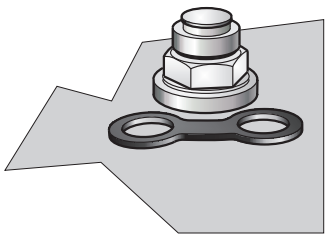
**3.** Breather valve activated



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***Painting the gear unit***

If the drive is to be overpainted or partially repainted, ensure that the breather valve and the oil seals are carefully covered with tape. Remove the tape strips after the paint work is finished.

# 4 Assembly / Disassembly

## 4.1 Required tools

- Wrench set
- Mounting device
- Shims and distance rings, if necessary
- Fixing devices for input and output elements
- Lubricant (e.g. NOCO® fluid)

***Installation tolerances***

| Shaft end | Flanges |
|---|---|
| Diametric tolerances in accordance with DIN 748<br>• ISO k6 for solid shafts with d, $d_1 \leq 50$ mm<br>• ISO k6 for solid shafts with d, $d_1 > 50$ mm<br>• Center hole in accordance with DIN 332, shape DR.. | Centering shoulder tolerances in accordance with DIN 42948<br>• ISO j6 with $b_1 \leq 230$ mm<br>• ISO h6 with $b_1 > 230$ mm |

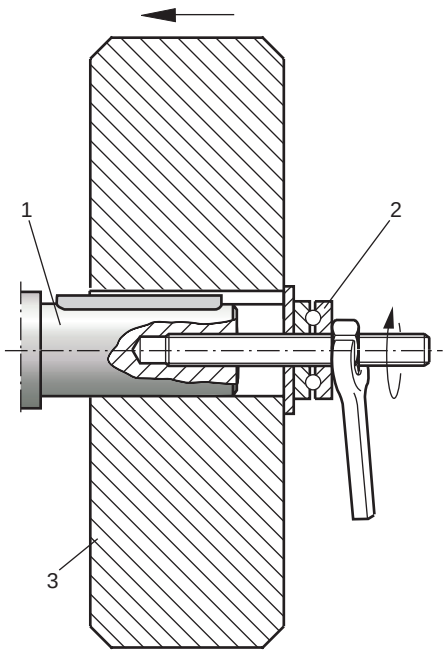
## 4.2 Installing the drive rod

Install the supplied drive rod (with Spiroplan® gear unit HW30 and helical-worm gear unit HS40/41) into the operating lever and secure it with a lock nut.

## 4.3 Gear units with solid shafts

***Mounting of carrying wheels***

Figure 1 shows an example of a mounting device for the installation of a carrying wheel onto the gear unit or motor shaft ends. It may be possible to dispense with the thrust bearing on the mounting device.




1 Shaft end of gear unit
2 Thrust bearing
3 Carrying wheel

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*Figure 1: Example of a mounting device for installation of carrying wheels*

Figure 2 shows the correct mounting arrangement ② of a carrying wheel in order to avoid impermissible overhung loads.

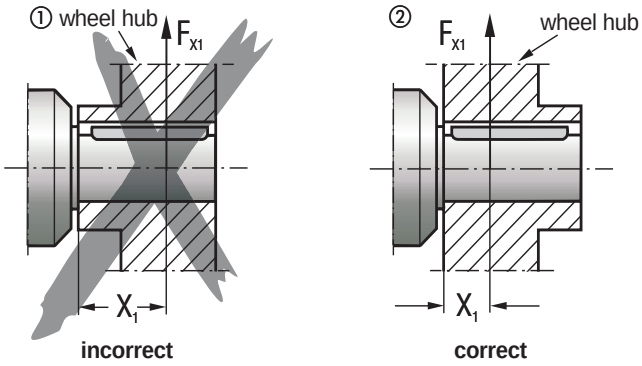


*Figure 2: Correct mounting arrangement of a carrying wheel*

- Only use a mounting device (see Figure 1) for installing input and output elements. Use the center bore and the thread on the shaft end for positioning purposes.
- **Never drive carrying wheels, etc. onto the shaft end by hitting them with a hammer (damage to bearings, housing and the shaft)!**
- Power transmission elements should be balanced after fitting and must not give rise to any impermissible radial or axial forces (see Figure 2 / permitted values see the "Trolley drive systems" catalog).

**Note:**

- Assembly is easier if you first apply lubricant to the output element or heat it up briefly (80 to 100 °C).

**Input and output elements such as carrying wheels must have protection against contact!**

***Mechanical clutch***

The output can be mechanically separated from a continuously running motor by activating the clutch.

Pole-switchable motors or motors controlled by frequency inverters should be engaged at low output speeds.

# 5 Startup

## 5.1 Startup of gear units HW30 and helical-worm gear units HS..

**The direction of rotation of the output shaft on the HS40/41 helical-worm gear units was changed from CW to CCW in comparison to the predecssor SHB4. Swap two motor feeder cables to change the direction of rotation.**

***Running-in period***

The Spiroplan® gear unit HW30 and the helical-worm gear unit HS.. require a running-in period of at least 24 hours before reaching their maximm efficiency. A separate running-in period for each direction of rotation is required if the gear unit is operated in both directions of rotation. Table 1 shows the average power reduction during the running-in period.

| | Power reduction for helical-worm gear unit HS.. | i range | Power reduction Spiroplan® gear unit HW30 | i range |
|---|---|---|---|---|
| **1 speed** | approx. 12 % | approx. 50...280 | approx. 15 % | approx. 40…75 |
| **2 speeds** | approx. 6 % | approx. 20…75 | approx. 10 % | approx. 20…30 |
| **3 speeds** | - | - | approx. 8 % | approx. 15 |
| **4 speeds** | - | - | approx. 8 % | approx. 10 |
| **5 speeds** | approx. 3 % | approx. 6…25 | approx. 5 % | approx. 8 |

*Table 1: Power reduction for helical-worm gear units HS.. and Spiroplan® gear units HW30*

# 6 Inspection / Maintenance

## 6.1 Inspection and maintenance intervals

| Interval | What to do? | → Section |
|---|---|---|
| Every **3000** machine hours<br>At least **every six months** | Check the oil | see Section 6.3 |
| Depending on **operating conditions**<br>(→ Figure 3) at least **every 3 years** | Change mineral oil | |
| | Renew the anti-friction bearing | |
| Depending on **operating conditions**<br>(→ Figure 3) at least **every 5 years** | Change synthetic oil | |
| | Renew the anti-friction bearing | |
| Spiroplan® gear units HW30 are lubricated for life and, therefore, are maintenance-free. | | |

*Table 2: Inspection and maintenance intervals*

## 6.2 Lubricant change intervals

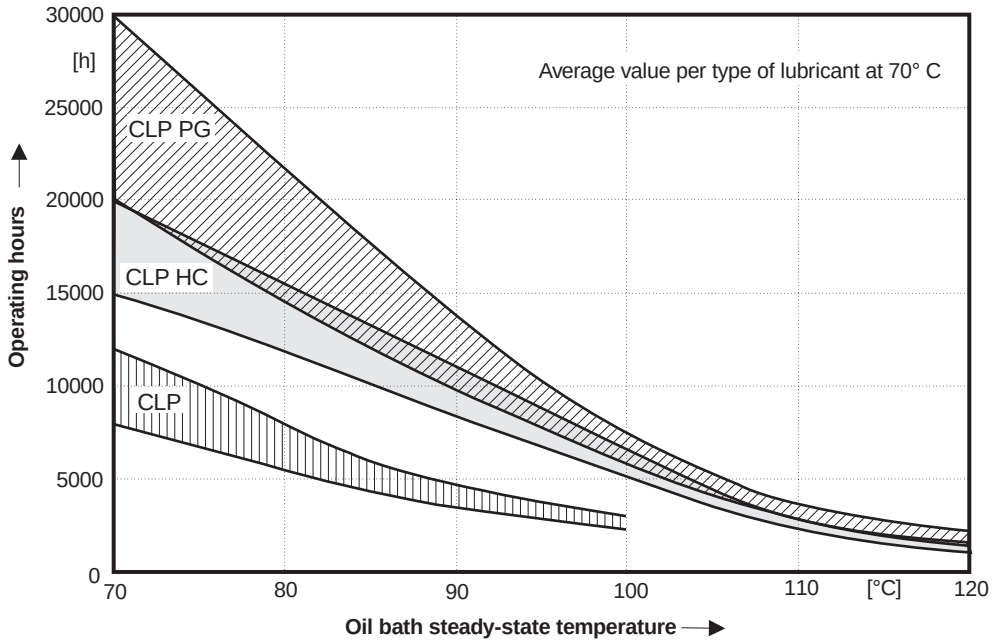


*Figure 3: Change intervals for standard gear units under normal environmental conditions. Change the oil more frequently when using special versions subject to more severe/ aggressive environmental conditions!*

## 6.3 Inspection and maintenance

Do not mix synthetic lubricants with each other and do not mix synthetic and mineral lubricants!

Oil is the standard lubricant.

The location of the oil level plug, the oil drain plug and the breather plug for the different mounting positions can be found in the corresponding figures (see section 8.1).

***Checking the oil level***

1. **Disconnect the drive and secure against unintentional switch-on!**
   **Wait until the gear unit has cooled down – Danger of burns!**
2. For modified mounting positions refer to Section 3.3!
3. For gear units with oil level plug:
   Remove oil level plug, check oil level and adjust if necessary, replace oil level plug.

***Checking the oil***

1. **Disconnect the drive and secure against unintentional switch-on!**
   **Wait until the gear unit has cooled down – Danger of burns!**
2. Remove some oil from the oil drain plug.
3. Check the oil consistency:
   – viscosity
   – if the oil is visibly strongly contaminated, it is recommended to change it sooner than specified in the maintenance intervals in section 6.1
4. For gear units with oil level plug:
   Remove oil level plug, check oil level and adjust if necessary, replace oil level plug.

***Changing the oil***

Change the oil only when the gear unit is at operating temperature.

1. **Disconnect the drive and secure it against unintentional switch-on!**
   **Wait until the gear unit has cooled down – Danger of burns!**
   **Note:** However, the gear unit must still be warm, otherwise the high viscosity of excessively cold oil will make it harder to drain the oil correctly.
2. Place a container underneath the oil drain plug.
3. Remove the oil level screw, breather plug/breather valve and oil drain plug.
4. Drain all the oil.
5. Screw in the oil drain plug.
6. Fill new oil of the same type through the breather hole. In other cases please consult the SEW service department.
   – Fill to oil volume in accordance with the mounting positions (see Section 8.1) or the details given on the name plate.
   – Check at the oil level screw.
7. Screw the oil level plug back in.
8. Install breather plug/breather valve.

# 7 Operation and Service

**Please provide the following information if you require assistance from our customer service department:**

- Nameplate data (complete)
- State type and extent of the fault
- Time and circumstances of the fault
- Presumed cause

## *7.1 Gear unit malfunction*

| Malfunction | Possible cause | Solution |
|---|---|---|
| Unusual, regular running noise | a) Meshing/grinding noise: Bearing damage<br>b) Knocking noise: Irregularity in the gearing | 1. Check the oil (→ Section 6.3)<br>2. Contact customer service |
| Unusual, irregular running noise | Foreign bodies in the oil | 1. Check the oil (→ Section 6.3)<br>2. Stop the drive, contact customer service |
| Oil leaking [1)]<br>• from the motor flange<br>• from the motor oil seal<br>• from the gear unit flange<br>• from the output end oil seal | a) Seal defective<br>b) Gear unit not vented | for a) Call customer service<br>for b) Vent the gear unit (→ Section 8) |
| Oil leaking<br>• from the breather valve | a) Too much oil<br>b) Breather valve not fitted properly<br>c) Frequent cold starts (oil foams) and/ or high oil level | for a) Correct the oil level (→ Section 6.3)<br>for b) Fit the breather valve correctly (→ Section 8.1) |
| Output shaft is not rotating although the motor is running or the input shaft is rotating | Clutch interrupted | 1. Check clutch function On / Off<br>2. Send in the gear unit/geared motor for repair |

1) It is normal for small amounts of oil/grease to leak out of the oil seal during the **running-in phase (24 hour running time)**.

# 8 Mounting positions

## 8.1 General information on mounting positions

***Mounting position designation***

SEW distinguishes the four mounting positions M1 – M4 with right-angle geared motors for trolley drive systems. The following figure shows the spatial position of the gear unit with mounting positions M1 – M4.

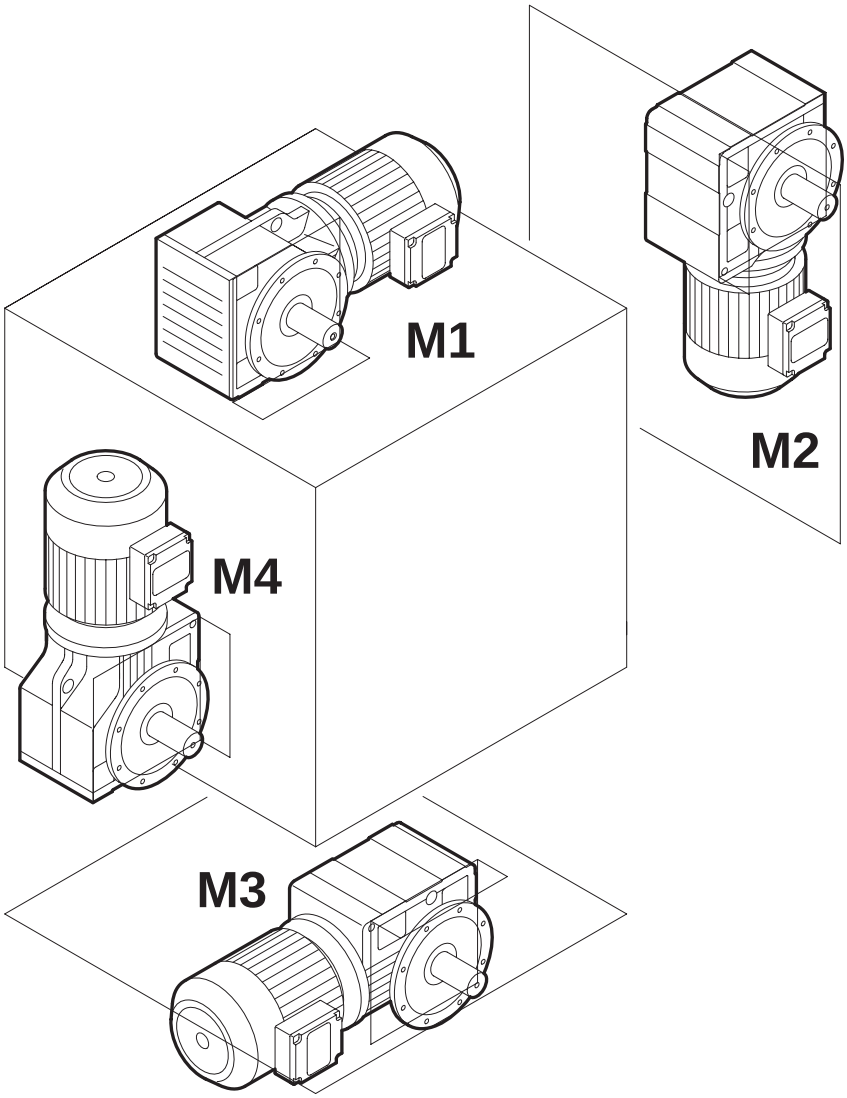


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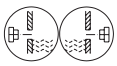
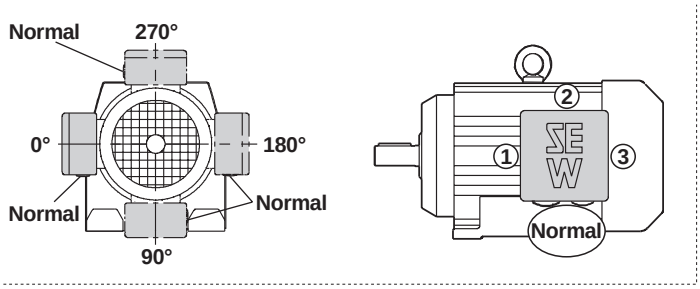
*Figure 9: Representation of mounting positions M1 – M4 for right-angle geared motors.*

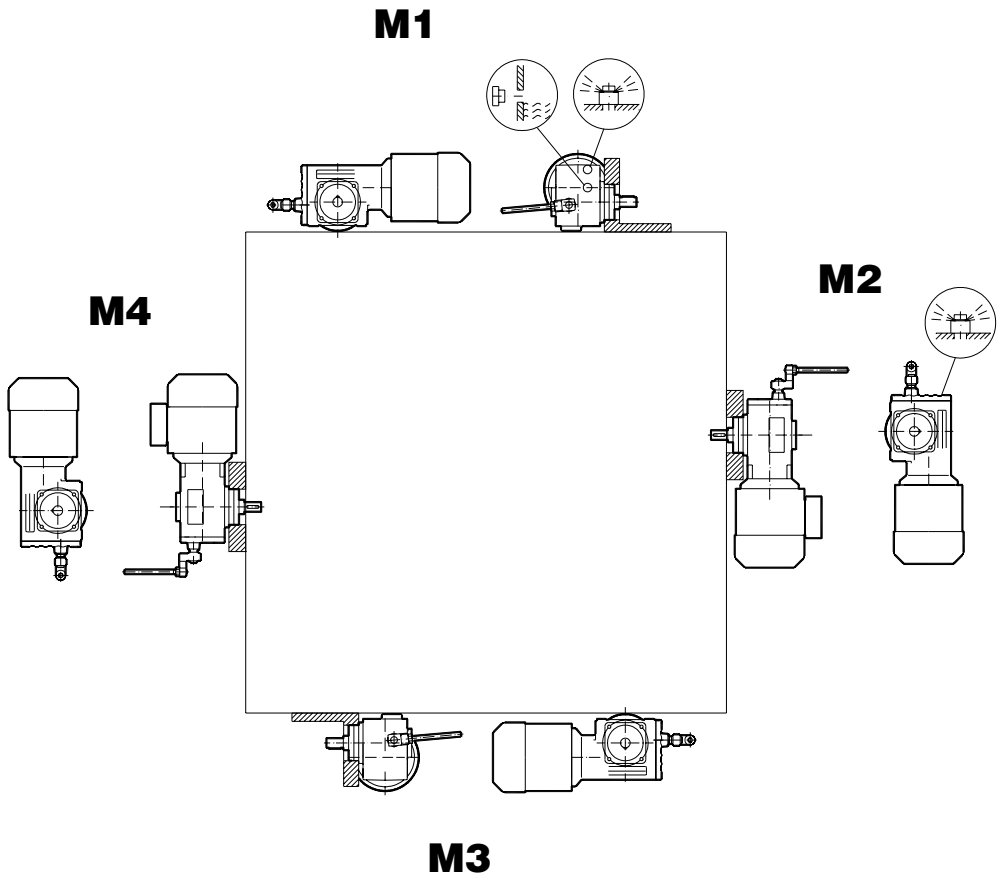
***List of symbols***

The following table shows the symbols used in the mounting position sheets and their meanings:

| Symbol | Meaning |
|---|---|
| | Breather valve |
|  | Oil level inspection plug |
| | Oil drain plug |

## 8.2 HW30 D..



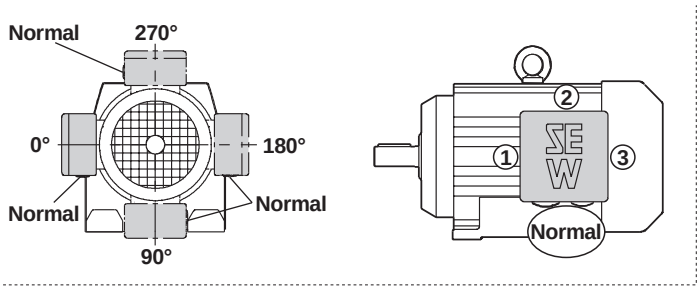



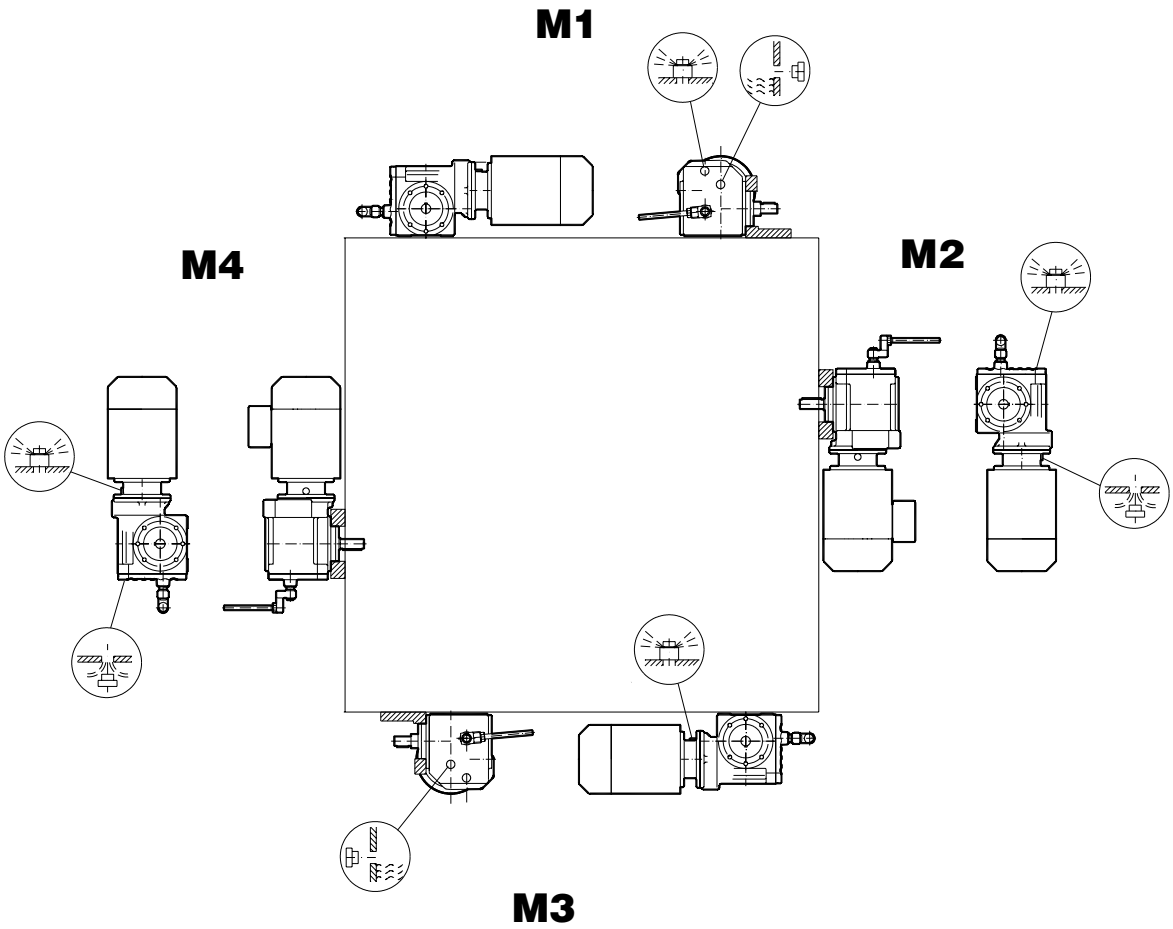
**M3, M4**

**M2, M3, M4**

**M1, M2, M3, M4**

## *8.3 HS40 D.., HS41 D..*

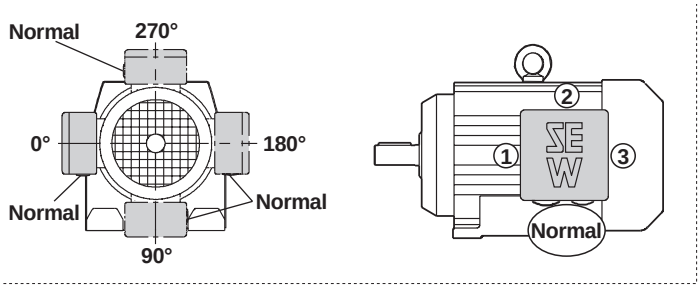


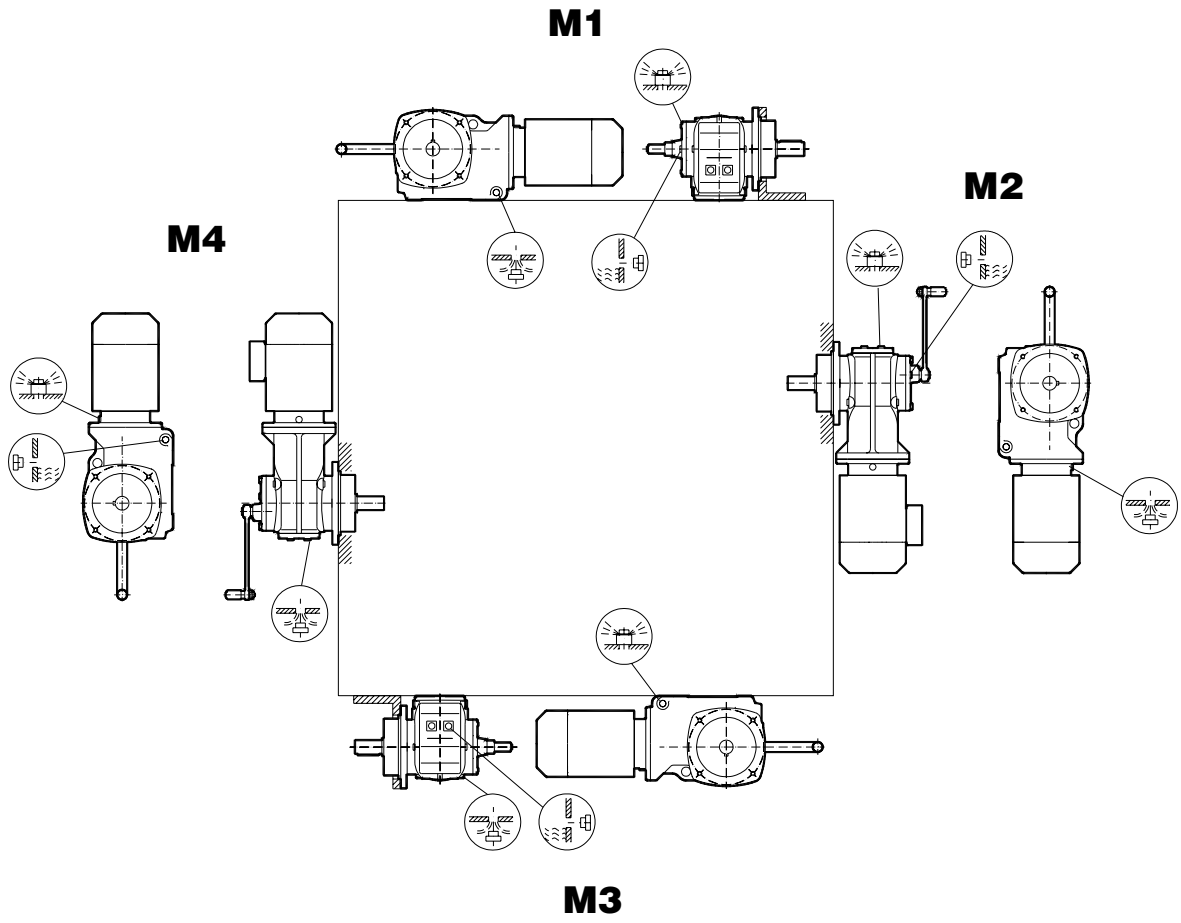




**M2, M4**

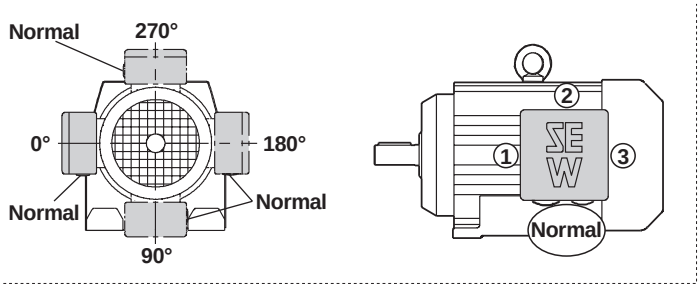
**M1, M3**

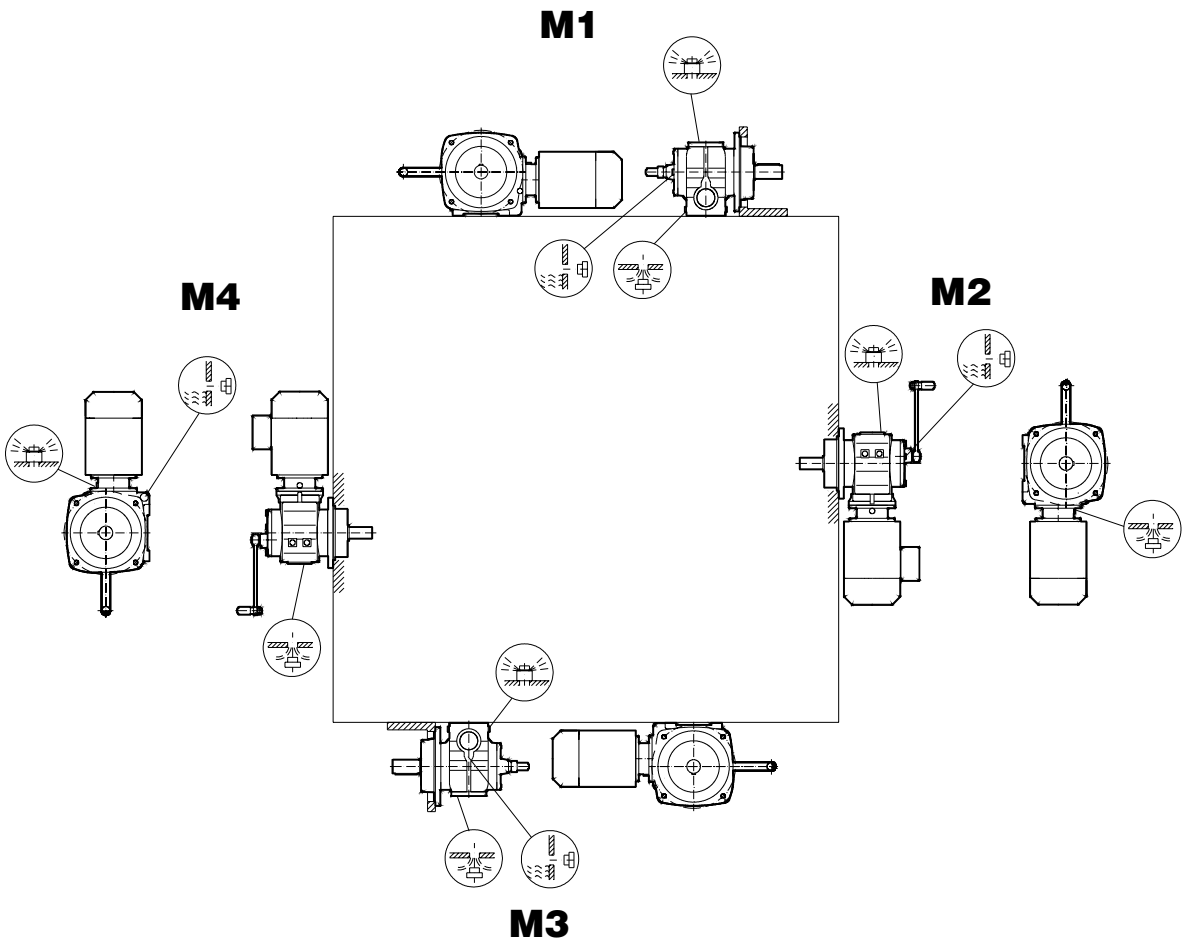
## 8.4 HK40D...



## *8.5 HS50 D.., HS60 D..*



# 9 Technical Data

## *9.1 Lubricant filling quantities*

The following table shows the lubricant filling quantities with respect to the mounting positions M1 – M4. It is essential to use the **oil level screw as an indicator of the correct lubricant quantity** during filling.

| Gear unit type | Filling quantity in liter | | | |
|---|---|---|---|---|
| | M1 | M2 | M3 | M4 |
| **HW30** | 0.65 | 0.65 | 0.65 | 0.75 |
| **HS40** | 1.2 | 1.45 | 0.95 | 1.9 |
| **HS41** | 1.2 | 1.45 | 0.95 | 1.9 |
| **HK40** | 2.0 | 2.0 | 2.3 | 2.8 |
| **HS50** | 1.4 | 1.4 | 1.5 | 2.2 |
| **HS60** | 2.8 | 2.7 | 2.8 | 4.1 |

*Table 3: Lubricant filling quantities*

## 9.2 Recommended lubricants for SEW drives

**Lubrication table for SEW drives**

| Gear unit type | Ambient temperature range | Lubricant type DIN (ISO) | ISO viscosity resp. NLGI class | Mobil | Shell | Klüber Lubrication | Aral | BP | Tribol | Texaco | Optimol | Fuchs |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Helical gear units, helical-bevel gear units, parallel gear units | -10 0°C +50 +100 Standard +40 | CLP (CC) | VG 220 | Mobilgear 630 | Shell Omala 220 | Klüberoil GEM 1-220 | Aral Degol BG 220 | BP Energol GR-XP 220 | Tribol 1100/220 | Meropa 220 | Optigear BM 220 | Renolin CLP 220 |
| | -25 +80 | CLP PG | VG 220 | Mobil Glygoyle 30 | Shell Tivela WB | Klübersynth GH 6-220 | Aral Degol GS 220 | BP Enersyn SG-XP 220 | Tribol 800/220 | Synlube CLP 220 | Optiflex A 220 | |
| | * -40 +80 | CLP HC | VG 220 | Mobil SHC 630 | Shell Omala 220 HD | Klübersynth GEM 4-220 | Aral Degol PAS 220 | | Tribol 1510/220 | Pinnacle EP 220 | Optigear Synthetic A 220 | Renolin Unisyn CLP 220 |
| | * -40 +40 | CLP HC | VG 150 | Mobil SHC 629 | | Klübersynth GEM 4-150 | | | | | | |
| | -20 +25 | CLP (CC) | VG 150 | Mobilgear 629 | Shell Omala 100 | Klüberoil GEM 1-150 | Aral Degol BG 100 | BP Energol GR-XP 100 | Tribol 1100/100 | Meropa 150 | Optigear BM 100 | Renolin CLP 150 |
| | -30 +10 | CLP (CC) | VG 68-46 | Mobil D.T.E. 15M | Shell Tellus T 32 | Klüberoil GEM 1-68 | Aral Degol BG 46 | | Tribol 1100/68 | Anubia EP 46 | Optigear 32 | Renolin B 46 HVI |
| | * -40 +10 | CLP HC | VG 32 | Mobil SHC 624 | | Klübersynth GEM 4-32 | | | | Cetus PAO 46 | | |
| | * -40 -20 | HLP (HM) | VG 22 VG 15 | Mobil D.T.E. 11M | Shell Tellus T 15 | MT 30 ROT | | BP Energol HLP-HM 10 | | Aircraft Hydr. Oil 15 | | |
| | 0 Standard +40 | CLP (CC) | VG 680 | Mobilgear 636 | Shell Omala 680 | Klüberoil GEM 1-680 | Aral Degol BG 680 | BP Energol GR-XP 680 | Tribol 1100/680 | Meropa 680 | Optigear BM 680 | Renolin CLP 680 |
| Helical-worm gear units | -20 +60 | CLP PG | VG 680 1) | Mobil Glygoyle HE 680 | | Klübersynth GH 6-680 | | BP Enersyn SG-XP 680 | Tribol 800/680 | Synlube CLP 680 | | |
| | * -30 +80 | CLP HC | VG 460 | Mobil SHC 634 | Shell Omala 460 HD | Klübersynth GEM 4-460 | | | | | | |
| | * -40 +10 | CLP HC | VG 150 | Mobil SHC 629 | | Klübersynth GEM 4-150 | | | | | | |
| | -20 +10 | CLP (CC) | VG 150 VG 100 | Mobil D.T.E. 18M | Shell Omala 100 | Klüberoil GEM 1-150 | Aral Degol BG 100 | BP Energol GR-XP 100 | Tribol 1100/100 | Meropa 100 | Optigear BM 100 | Renolin CLP 150 |
| | -25 +20 | CLP PG | VG 220 1) | Mobil Glygoyle 30 | | Klübersynth GH 6-220 | | | Tribol 800/220 | Synlube CLP 220 | Optiflex A 220 | |
| | * -40 0 | CLP HC | VG 32 | Mobil SHC 624 | | Klübersynth GEM 4-32 | | | | Cetus PAO 46 | | |
| W gear units | -20 Standard +40 | SEW PG | VG 460 3) | | | Klüber SEW HT-460-5 | | | | | | |
| | * -40 +10 | API GL5 | SAE 75W90 (~VG 100) | Mobilube SHC 75 W90-LS | | | | | | | | |
| R, K, F, S gear units | * -30 +40 | HCE | VG 460 | | Shell Cassida Fluid GL 460 | Klüberöl 4UH1-460 Klüberbio CA2-460 | Aral Eural Gear 460 | | | | | |
| | -20 +40 | E | VG 460 | | Shell Tivela Compound A | Klübersynth GE 46-1200 | Aralub MFL 00 | BP Energrease LS-EP 00 | | Multifak 6833 EP 00 | Multifak EP 000 | Longtime PD 00 | Renolit SF 7- 041 |
| R 32 R 302 | -25 -15 Standard +40 +60 | DIN 51181 | 00 000 - 0 2) | Glygoyle Grease 00 | Shell Alvania GL 00 | | | | | | | |
| Grease | Bio oil Food ind. oil | | 2) | Mobilux EP 004 | | | | | | | | |

◀ = lubricants supplied at the assembly plants SEW USOCOME (F)

▬ = lubricants supplied at the assembly plants SEW EURODRIVE (BRD)

▭ = synthetic lubricants

▭ = mineral lubricants

1) Helical-worm gear units with PG oil. Consult SEW-Eurodrive

2) Consult SEW-Eurodrive for other gear units

3) Special lubricant for Spiroplan gear units only

★ Please note: critical startup behaviour at low temperatures.

CLP PG = polyglycol

CLP HC = synth. hydrocarbon

E = diester oil (water contamination class WGK 1)

HCE = synth. hydrocarbons + diester oil (USDA - H1 approval)

CLP = mineral oil

HLP = hydraulic oil

01 805 492e

KBTS/GaVI

***Anti-friction bearing grease***

It is recommended to change the grease for anti-friction bearings with grease filling at the same time that the oil is changed.

| | Ambient temperature | Basis | current filling | Manu-facturer |
|---|---|---|---|---|
| **Gear unit anti-friction bearing** | -30 °C to +60 °C<br>-40 °C to +80 °C | mineral<br>synthetic | Mobilux EP 2<br>Mobiltemp SHC 100 | Mobil |
| **Motor anti-friction bearing** | -25 °C to +80 °C<br>-25 °C to +60 °C<br>+80 °C to +100 °C<br>-45 °C to -25 °C | mineral<br>mineral<br>synthetic<br>synthetic | Unirex N3<br>Alvania R3<br>Barrierta L55/2<br>Aero Shell Grease 16 | Esso<br>Shell<br>Klüber<br>Shell |

*Table 4: Anti-friction bearing grease*

The applied grease filling quantity must amount to

- one-third of the cavities between the rolling elements for fast running bearings (motor and gear unit input shaft end)
- two-thirds of the cavities between the rolling elements for slow running bearings (motor and gear unit input shaft end)

# SEW Worldwide

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| | Additional addresses for service in Germany provided on request! | | |
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| | Dayton | SEW-EURODRIVE INC.<br>2001 West Main Street<br>Troy, Ohio 45373 | Phone: (9 37) 3 35-00 36<br>Fax: (9 37) 4 40-37 99 |
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| | Additional addresses for service in the USA provided on request! | | |
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